by using an existing dedicated channel, so that the non-dedicated fast signalling channel is only resorted to if an existing dedicated channel is not available.

The characteristic features of the method according to the invention are declared in the characterising part of the independent claim for a method.

The invention applies also to a mobile station, the characteristic features of which are declared in the independent claim for a mobile station.

Additionally the invention applies also to a base station, the characteristic features of which are declared in the independent claim for a base station.

The transmission capacity requirement of fast signalling of the kind meant in this patent application is typically relatively small in comparison with the transmission capacity represented by a dedicated transmission channel in a cellular radio system. Therefore allocating a dedicated signalling channel would be most likely to waste allocatable transmission capacity. However, by defining a completely or virtually non-dedicated fast signalling channel it is possible to accommodate a relatively large number of fast signallers into a limited amount of reserved resources.

A completely non-dedicated fast signalling channel is a piece of transmission capacity defined as a combination of time, frequency and possibly other aspects such as code but without any limits as to who can access it. A virtually non-dedicated fast signalling channel is a similar piece of transmission capacity, which however comes with certain (relatively broad) access limits that discriminate between the devices that may attempt fast signalling therethrough. As an example of virtual non-dedicatedness there may be several fast signalling channels defined in a cell so that the mobile stations operative in the cell are divided into fast signalling groups. A mobile station is only allowed to use the fast signalling channel that corresponds to the group into which the mobile station belongs, but within the group the mobile stations belonging to that group are completely equal.

Using a separate fast signalling channel for reverse direction signalling is most reasonable in a situation where setting up a signalling connection would otherwise require the allocation of completely new dedicated communication resources. If, however, a mobile station has already in its use certain allocated uplink capacity, it may be worthwhile to multiplex the fast signalling with other transmission streams sharing the allocated uplink capacity instead of using a separate fast signalling channel. Not only does such multiplexing reduce potential interference to other simultaneous users of the separate fast signalling channel, but it makes also the

operation of the mobile station's transmitter simpler because instead of separate transmissions on separate channels only a single multiplexed transmission needs to be emitted.

A multiple access scheme must be devised in order to differentiate between the fast signallers that use a common fast signalling channel. For example time division multiple access, code division multiple access or a combination of these can be used. In the case of code division multiple access, joint detection or multiuser detection as well as antenna array techniques can be applied at the receiving end to alleviate the near/far problem and to enhance the possibility of successful detection.

BRIEF DESCRIPTION OF DRAWINGS

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

Fig. 1 illustrates schematically the use of fast signalling in association with transmitter diversity,

Fig. 2 illustrates the allocation of certain slots in a frame structure,

Figs. 3a, 3b and 3c illustrate certain alternatives of subdividing a slot,

Figs. 4a. 4b and 4c illustrate certain alternatives for mapping information into messages,

Fig. 5 illustrates a method according to an embodiment of the invention and

Fig. 6 illustrates an arrangement according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows schematically a communication connection where a transmitter 101 produces a signal to be transmitted and directs it through a controllable phase shifter

102 to a first transmitting antenna 103 as well as through a constant phase shift 104 to a second transmitting antenna 105. The transmitted signals arrive at the receiving antenna 106 of a receiver, from which they are conveyed through a joint channel estimator 107 to other receiver circuitry 108 for demodulation and decoding. The joint channel estimator 107 produces a channel estimate which describes, among other things, the relative phases of different signal components. From the channel estimate it is possible to deduce, what is the phase of the main signal component received from the first transmitting antenna 103 in relation to the phase of the main signal component received from the second transmitting antenna 105. The joint channel estimator 107 outputs this deduction result into a signalling transmitter 109, which transmits it in the upstream or reverse direction as feedback to the transmitting device. On the basis of the feedback it has received from the receiving station, the transmitting station adjusts the phase shift caused in the controllable phase shifter 102 so that the phase difference observed at the receiving station would be as small as possible. Also both transmission branches at the transmitting station may comprise controllable phase shifters.

A fast signalling channel is needed in the upstream or reverse direction for conveying the messages that describe the estimated phase difference at the receiver. Ideally the feedback information should be at the transmitting station in real time, because movements of a mobile station as well as changes in its environment cause relatively rapid changes in the observable reception characteristics. Information regarding a phase difference estimated at a certain moment of time becomes obsolete very quickly.

Fig. 2 illustrates schematically a communication situation where a first station 201, nominally designated as the transmitting station, communicates with eight second stations 211 to 218, nominally designated as the receiving stations. The designations being nominal only comes from the fact that all stations in fig. 2 both transmit and receive. Time division multiple access (TDMA) is applied in the forward direction so that the transmission of the transmitting station 201 consists of consecutive frames, each frame further consisting of eight consecutive slots. An exemplary radio capacity allocation of the size of one slot has been given to each receiving station so that each of the receiving stations only receives during every eighth slot. For the purposes of the present invention it is irrelevant how the allocations in the forward direction are made. In the reverse direction there exists a common fast signalling channel the resource allocation of which is of the size of one slot 221 per frame. All